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DISCUSSIONS.

In a recent number of the MONTHLY, Professor E. J. Moulton considered the nature of a course in advanced calculus which should serve as a bridge between the work in elementary calculus and more advanced subjects. In the first discussion below, Professor Gillespie presents the claims of elementary differential equations for adequately effecting this transition. The content which he proposes is by no means that of the course in elementary differential equations as it is usually given; neither does it coincide with the usual course in advanced calculus. Further expressions of opinion on the questions raised will be welcome.

Among the topics presented in courses common to the secondary and collegiate fields, probably no other is so difficult, and at times so discouraging, to teach satisfactorily, as mathematical induction. Professor Weaver, in the second discussion of this number, gives an amusing account of an analogy from life, which may be useful in illustrating the essential nature of the method of proof involved.

In the third discussion Professor Noble considers the process of altering the strength of a mixture by continuous addition of quantities of one component. Mathematically the situation turns out to involve a neat illustration of the notion of a derivative, leading to a simple differential equation; some of our readers will find here a useful supplementary problem for the class-room.

I. ADVANCED CALCULUS OR DIFFERENTIAL EQUATIONS.

By D. C. GILLESPIE, Cornell University.

The second course in calculus as it is often given,—following Goursat-Hedrick, *Mathematical Analysis*, Vol. I, let us say to be explicit,—breaks suddenly with what has gone before. It does not appeal to everyone as a natural continuation of previous work. The point of view is different, the emphasis is different, and even among those who have done well in the more elementary courses there are students with whom it is not successful. Professor E. J. Moulton's suggestive paper in the December number of the MONTHLY proposes a plan which would accomplish much that it is desirable to accomplish by the second course in the calculus and at the same time make the change less abrupt.

Even in the case of the future mathematicians, Professor Moulton feels, "It is too early in the student's career to introduce the critical attitude of higher mathematics." I am not sure that this phrase is quite clear. The student is perhaps fortunate to escape altogether the attitude that is more concerned with detecting error than with acquiring knowledge. On the other hand the desire and ability to analyze and see on what assumptions theorems are founded and how the results follow from the assumptions are, at every stage of the student's development, great assets. The point is, it seems to me, that while the teacher may encourage this desire he can not introduce this ability. The scales are not going to fall from the student's eyes at the teacher's command; they wear off, and indeed slowly. The plan proposed has rather this clear advantage, that,